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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10763,793	01/22/2004	Ned E. Cipollini	C-3226	7929
7590	01/04/2006			
M. P. Williams 210 Main Street Manchester, CT 06040			EXAMINER PARSONS, THOMAS H	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/763,793

Applicant(s)

CIPOLLINI, NED E.

Examiner

Thomas H. Parsons

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Page 1, line 23, after "March 17, 2003", suggest inserting --(now U.S. Patent No. 6,703,870)--;

Page 6, line 8, suggest deleting "to"; and,

Page 10, line 11, suggest changing "floor" to --flood--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "said step of providing" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Cipollini (6,379,827).

Claim 1: Cipollini in Figures 1-4 disclose a method of operating a fuel cell power plant (10) having fuel cells each comprising a membrane electrode assembly (16) including a proton exchange membrane (18) with cathode and anode electrode catalysts (24, 20) on opposed surfaces thereof, a support plate (22, 25), at least a substantial portion of which is hydrophilic, adjacent to each catalyst, and a hydrophilic porous water transport plate (12, 14) having passages (34) for reactant gas and passages (32) or coolant adjacent to each support plate (col. 4: 13-col. 7: 42), the method comprising:

during normal operation in which the fuel cell power plant (10) supplies electric power to a load, maintaining a pressure of coolant in the coolant passages (32) about 14 kPa-21 kPa (2 psi-3 psi) below the pressure of reactant gas in the reactant gas passages (34), thereby to allow only small volumes of water migrating between said reactant gas passages and said support plates (col. 7: 23-42);

during a shutdown procedure, reducing the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% of their coolant capacity; More particularly, Cipollini discloses on col. 8: 66-col. 9: 2, "For instance, if the pressure of the coolant is greater than, or substantially equal to, or even about 1 psi less than the pressure of the reactant fields, the coolant will migrate into the wettable substrates 22, 26.

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This is the same pressure that is instantly disclosed which will fill the support plates with coolant to about 50%; and

finally, draining water from the coolant passages (col. 7: 64-67).

Claim 3: Cipollini discloses during a shutdown procedure, reducing the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% of their coolant capacity. More particularly, Cipollini discloses on col. 8: 66-col. 9: 2, "For instance, if the pressure of the coolant is greater than, or substantially equal to, or even about 1 psi less than the pressure of the reactant fields, the coolant will migrate into the wettable substrates 22, 26. This is the same pressure that is instantly disclosed which will fill the support plates with coolant to about 50%.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-6 and 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cipollini (6,379,827).

Claim 1: Cipollini in Figures 1-4 disclose a method of operating a fuel cell power plant (10) having fuel cells each comprising a membrane electrode assembly (16) including a proton exchange membrane (18) with cathode and anode electrode catalysts (24, 20) on opposed surfaces thereof, a support plate (22, 25), at least a substantial portion of which is hydrophilic,

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adjacent to each catalyst, and a hydrophilic porous water transport plate (12, 14) having passages (34) for reactant gas and passages (32) or coolant adjacent to each support plate (col. 4: 13-col.

7: 42), the method comprising:

during normal operation in which the fuel cell power plant (10) supplies electric power to a load, maintaining a pressure of coolant in the coolant passages (32) about 14 kPa-21 kPa (2 psi-3 psi) below the pressure of reactant gas in the reactant gas passages (34), thereby to allow only small volumes of water migrating between said reactant gas passages and said support plates (col. 7: 23-42);

during a shutdown procedure, reducing the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% of their coolant capacity;

and finally, draining water from the coolant passages (col. 7: 64-67).

More particularly, Cipollini discloses on col. 8: 66-col. 9: 2, "For instance, if the pressure of the coolant is greater than, or substantially equal to, or even about 1 psi less than the pressure of the reactant fields, the coolant will migrate into the wettable substrates 22, 26. This is the same pressure that is instantly disclosed which will fill the support plates with coolant to about 50%.

Cipollini does not disclose reducing the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% -80% of their coolant capacity.

However, Cipollini, in the abstract, discloses that various means (50,56,61,60,70,78,66,54,77) drive and control the oxidant flow field, the fuel reactant flow field,

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and the coolant flow field such that the pressure of the two reactant flow fields is sufficiently greater (ΔP_1) than the pressure of the coolant flow field during on load operation to substantially exclude coolant from the reactant flow fields and limit the availability of coolant to the wettable substrates. However, those means drive and control the reactant flow fields and the coolant flow field to such relative pressures (ΔP_2) during shutdown and start-up (e. g., small or zero differential near ambient) as to allow coolant to flood the wettable substrates, and in some instances also the reactant flow fields, and thereby protectively inert the system. On col. 6:24-28, Cipollini discloses that the pressure of hydrogen flowing through the supply line 52 is controlled by a controller 54 which controllably adjusts a supply valve 56. The pressure of hydrogen flowing through the supply line 52 may additionally be controlled by a supply regulator 58. And on col. 7: 35-42, Cipollini discloses that the controller 54 controllably actuates and adjusts the flow of the coolant and reactant flow fields 36, 38, 48 in conjunction with the pressure transducer 77 in order to maintain the coolant flow field 36 at a lower pressure than that of the anode and cathode flow fields 48, 38. The pressure differential is in the range of about 2 to 3 psi during normal on load operation, and may be designated ΔP_1 . Further, the fuel cell power plant system including the various means to drive and control the oxidant flow field, the fuel reactant flow field, and the coolant flow field are the same as those instantly disclosed.

Accordingly, in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini to reduce the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% -80% of their coolant capacity or to any other desired coolant capacity.

Claim 2: The rejection of claim 2 is as set forth above in claim 1 wherein, in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini to reduce the pressure differential between the coolant and reactant gas so that the support plates are filled with coolant to about 70% of their coolant capacity.

Claim 3: Cipollini discloses during a shutdown procedure, reducing the pressure differential between the coolant and reactant gas so that the support plates (22, 25) are filled with coolant to about 50% of their coolant capacity. More particularly, Cipollini discloses on col. 8: 66-col. 9: 2, "For instance, if the pressure of the coolant is greater than, or substantially equal to, or even about 1 psi less than the pressure of the reactant fields, the coolant will migrate into the wettable substrates 22, 26. This is the same pressure that is instantly disclosed which will fill the support plates with coolant to about 50%.

Claim 4: The rejection of claim 4 is as set forth above in claim 1 wherein further on col. 8: 53-59 Cipollini discloses that "...pressure is regulated during shutdown to achieve the desired rate and degree of flooding, first, the substrates 22,26 and then, optionally, the reactant flow fields 38,48. The new pressure differential, ΔP_2 , of the coolant flow field relative to the reactant flow fields is then such, relative to ΔP_1 , to allow coolant to readily move into substrates 22, 26.

Accordingly, in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini during the shutdown procedure, to adjust the pressure of coolant in the water

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transport plates to between 3 kPa (0.44 psi) and 6.5 kPa (0.94 psi) (or any other desired pressure) below the pressure of reactant gases in the water transport plate.

Claim 5: The rejection of claim 5 is as set forth above in claim 4 wherein in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini to adjust the pressure differential to between about 4 kPa (0.58 psi) and 5.2 kPa (0.75 psi).

Claim 6: The rejection of claim 3 is as set forth above in claims 1 and 3 wherein, in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini to adjust pressure differential is adjusted to about 4.8 kPa (0.7 psi).

Claim 8: The rejection of claim 1 is as set forth in claim 1, 3 and 6 wherein in light of the teaching of Cipollini, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the system of Cipollini to cause the substrate to be about 30% hydrophobic and about 70% hydrophilic.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cipollini as applied to claim 1 above, and further in view of Fredley (5,998,058).

Cipollini is as applied, argued and disclosed above, and incorporated herein.

Cipollini does not disclose providing in the fuel cells, support plates which have substantially uniformly hydrophobic regions in a hydrophilic substrate to cause said substrate to be 10%-40% hydrophobic and 60%-90% hydrophilic.

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Fredley discloses support plates provided in fuel cells which have substantially uniformly hydrophobic regions in a hydrophilic substrate to cause said substrate to be 10%-40% hydrophobic and 60%-90% hydrophilic (abstract, col. 3: 59-64, col. 4: 30-42, and col. 8: 37-44).


Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the support plate of Cipollini with the support plates of Fredley because Fredley teaches support plates that would have enhanced the uniformity of distribution and rates of transport of fluids from surfaces of electrodes thereby increasing the operating efficiencies of fuel cells.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H. Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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